



(19)

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(11)

EP 0 895 137 A1

(12)

## EUROPEAN PATENT APPLICATION

(43) Date of publication:  
03.02.1999 Bulletin 1999/05

(51) Int Cl. 6: G03G 15/08, G03G 15/01

(21) Application number: 98305473.5

(22) Date of filing: 09.07.1998

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE  
Designated Extension States:  
AL LT LV MK RO SI

(30) Priority: 31.07.1997 KR 9736546

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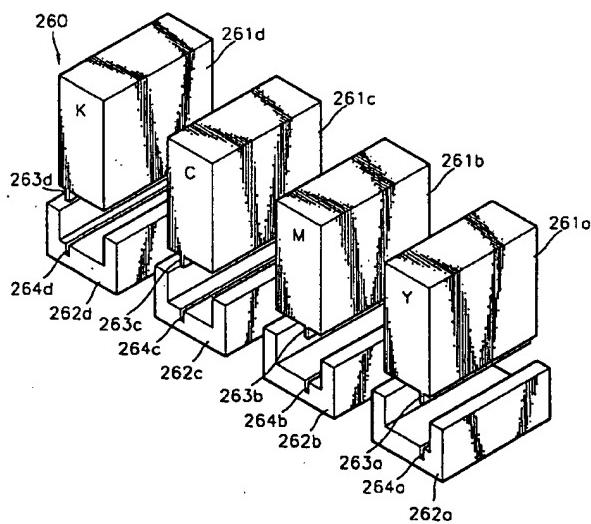
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## (54) Toner supplying device for imaging system

(57) A toner supplying device (260) for supplying a toner having a predetermined colour to an imaging system is provided. The toner supplying device includes a plurality of toner containers (261a-d) for supplying toners having predetermined colours to the imaging system, a plurality of toner hoppers (362a-d) on which the plurality of toner containers (361a-d) are mounted, wherein the respective toner containers (261a-d) each has a toner container identifying means (263, 264) con-

structed by complementary coupling structures of the toner containers and the toner hoppers so that a toner container (261) containing a toner having a specific colour is exclusively coupled to a specific toner hopper (262). Therefore, since toner hoppers (262) and toner containers (261) mounted thereon are complementarily coupled for the respective colours, when the toner container is mounted on the wrong toner hopper, mounting is not possible. Therefore, problems due to erroneous mounting of a toner container do not occur.

FIG.2



**Description**

[0001] The present invention relates to an imaging system applied to a laser printer, and more particularly, to a toner supplying device for an imaging system, for supplying a toner to a printer.

[0002] An imaging system applied to a laser printer and the like generally employs a mechanism for supplying a developer having a predetermined colour to a photosensitive medium such as a photoreceptor drum or a photoreceptor belt, on which a latent electrostatic image is formed, and developing the latent electrostatic image into a toner image.

[0003] The developer is divided into a liquid type and a powder type. The liquid developer has a fine particle toner having a predetermined colour dispersed in a volatile liquid carrier. The liquid laser printer using such a developer liquid has a better printing quality than the dry laser printer using a powdered toner, and can be protected from harmful toner powder. Thus the liquid type printer is being increasingly used.

[0004] Referring to Figure 1, a conventional colour laser printer includes a photoreceptor belt 110 in a closed loop, and first, second and third rollers 121, 122 and 123 for circulating the photoreceptor belt 110. In Figure 1, reference numeral 124 represents a transfer roller for transferring the toner image formed on the photoreceptor belt 110 to a sheet of paper 126, and reference numeral 125 is a pressing roller for pressing the sheet 126 against the transfer roller 124. Also, reference numeral 151 is a drying roller for removing a liquid carrier from the toner image formed by a development device to be described later, and reference numeral 152 is a heat roller for heating the drying roller 151.

[0005] A charging station 135 for charging the photoreceptor belt 110 is positioned in the vicinity of the carrying block of the photoreceptor belt 110 between the first and second rollers 121 and 122. In the carrying block of the photoreceptor belt 110 between the second and third rollers 122 and 123, a plurality of laser scanning units (LSUs) 130a through 130d for forming a latent electrostatic image on the photosensitive region of the photoreceptor belt 110 by irradiating laser beams onto the photoreceptor belt 110, and a plurality of development devices 140a through 140d for developing the latent electrostatic image into the toner image by applying a developer liquid having a toner of a predetermined colour to a region where the latent electrostatic image is formed, are alternately installed.

[0006] The respective development devices 140a through 140d supply developer liquids having yellow (Y), magenta (M), cyan (C) and black (K) colours for implementing the respective colours. A toner supplying device 160 for supplying a differently coloured toner is provided in the respective development devices 140a through 140d. The toner supplying device 160 includes four toner containers 161a, 161b, 161c and 161d containing toners each having the Y, M, C and K colours,

and four toner hoppers 162a, 162b, 162c and 162d in which the four toner containers 161a through 161d are mounted to be supported.

[0007] The toner containers of the conventional toner supplying device have the same shape and have a label indicating each colour on the outer surface of their bodies. Thus, a user may mount a toner container on a wrong toner hopper for replacement of the toner containers. In some cases, a label for colour identification may not be put on the toner container. Also, the identification mark of the label may not be discernible due to repeated use. Thus, the corresponding toner hopper must be carefully checked to mount the toner container on the right toner hopper.

[0008] If the toner container is erroneously mounted, an undesired colour may be printed. Also, the toner supplied from the erroneously mounted toner container and the toner remaining on a toner supply line connected to the toner hopper must be removed.

[0009] With a view to solve or reduce the above problem, it is an aim of preferred embodiments of the present invention to provide a toner supplying device for an imaging system having an improved means for identifying toner containers for the respective colours.

[0010] According to a first aspect of the invention, there is provided a toner supplying device for an imaging system including a plurality of toner containers for supplying toners having predetermined colours to the imaging system, a plurality of toner hoppers on which the plurality of toner containers are mounted, wherein the respective toner containers each have a toner container identifying means constructed by complementary coupling structures of the toner containers and the toner hoppers so that a toner container containing a toner having a specific colour is exclusively coupled to a specific toner hopper.

[0011] Preferably, the toner container identifying means includes ribs protruding on one side of each toner container at different locations depending on the colour of the toner contained in the toner container, and grooves into which the ribs are inserted, and formed on the toner hoppers at the locations corresponding to the ribs.

[0012] Preferably, the toner container identifying means includes grooves on one side of each toner container at different locations depending on the colour of the toner contained in the toner container, and ribs into which the grooves are inserted, and protruding on the toner hoppers on which the toner containers are mounted, at the locations corresponding to the grooves.

[0013] The above objective and advantages of the present invention will become more apparent by describing in detail a preferred embodiment thereof with reference to the attached drawings in which:

Figure 1 is a schematic diagram illustrating important parts of a conventional imaging system;

Figure 2 is a schematic perspective view of a toner supplying device for an imaging system according to a first embodiment of the present invention; and

Figure 3 is a schematic perspective view of a toner supplying device for an imaging system according to a second embodiment of the present invention.

[0014] Referring to Figure 2, a toner supplying device 260 for an imaging system according to the present invention includes four toner containers 261a, 261b, 261c and 261d, and four toner hoppers 262a, 262b, 262c and 262d. The four toner containers 261a, 261b, 261c and 261d contain toners each having Y, M, C and K colours, and are detachably mounted on and supported by the four toner hoppers 262a through 262d.

[0015] A toner container identification means for identifying the toner containers 261a, 261b, 261c and 261d containing toners each having Y, M, C and K colours is provided in the toner supplying device 260. The toner container identification means is constructed such that the four toner hoppers 262a, 262b, 262c and 262d, are mounted on the four toner containers 161a through 161d by being complementarily coupled. In other words, the four toner hoppers 262a, 262b, 262c and 262d, and the four toner containers 161a through 161d have differently shaped characteristic structures on the respective coupling portions. For example, the first toner container 261a containing a yellow toner is coupled only to the first toner hopper 262a but is not coupled to the other toner hopper 262b, 262c or 262d.

[0016] In detail, ribs 263a, 263b, 263c and 263d protrude from the bottom surfaces of the toner containers 261a, 261b, 261c and 261d, and their locations in the toner containers 261a, 261b, 261c and 261d are different for the respective colours of the toners contained in the respective toner containers 261a, 261b, 261c and 261d. Also, grooves 264a, 264b, 264c and 264d into which the ribs 263a, 263b, 263c and 263d are inserted are formed on the toner hoppers 262a, 262b, 262c and 262d at the locations corresponding to the ribs 263a, 263b, 263c and 263d. Thus, the respective toner containers 261a, 261b, 261c and 261d are mountable only to specific toner hoppers 262a, 262b, 262c and 262d. For example, when the toner container 261a containing a yellow toner is mounted on the corresponding toner hopper 262a, the location of the rib 263a formed on the toner container 261a coincides with that of the groove 264a formed on the toner hopper 262a so that the toner container 261a can be mounted. On the other hand, when the toner container 261a is mounted on the toner hopper 262b, 262c or 262d, which is not the proper position for the toner container 261a, the location of the rib 263a does not coincide with that of the groove 264b, 264c or 264d formed on the toner hopper 262b, 262c or 262d, respectively, so that the toner container 261a cannot be mounted.

[0017] In the toner supplying device 260 for an imag-

ing system according to the present invention, unlike the conventional art in which the toner containers can be identified by the naked eye, the means for identifying the toner containers 261a through 261d is constructed such that the toner hoppers 262a through 262d and the toner containers 161a through 161d have complementary coupling structures. Thus, there is no possibility of erroneous mounting of the toner containers 261a through 261d.

[0018] Figure 3 is a schematic perspective view of a toner supplying device for an imaging system according to a second embodiment of the present invention.

[0019] Referring to Figure 3, a toner supplying device 360 for an imaging system according to the present invention includes a toner container identifying means constituted by four grooves 364a, 364b, 364c and 364d formed at different locations of the bottom surfaces of four toner containers 361a, 361b, 361c and 361d, and four ribs 363a, 363b, 363c and 363d protruding from the upper surfaces of the toner hoppers 362a, 362b, 362c and 362d, at locations corresponding to the grooves 364a, 364b, 364c and 364d and inserted into the grooves 364a, 364b, 364c and 364d. The toner container identifying means having the aforementioned configuration has the same operation and effects as those in the first embodiment of the present invention.

[0020] As described above, in the toner supplying device for an imaging system according to the present invention, since toner hoppers and toner containers mounted thereon are complementarily coupled for the respective colours, when the toner container is mounted on the wrong toner hopper, mounting is not possible. Therefore, problems due to erroneous mounting of a toner container do not occur.

[0021] The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0022] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0023] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0024] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel

one, or any novel combination, of the steps of any method or process so disclosed.

**Claims**

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1. A toner supplying device for an imaging system comprising:

a plurality of toner containers (261a-d; 361a-d) 10  
for supplying toners having predetermined colours to the imaging system;

a plurality toner hoppers (262a-d; 362a-d) on which the plurality of toner containers (261a-d; 15  
361a-d) are mounted,

wherein the respective toner containers (261a-d; 361a-d) each has a toner container identifying means (263, 264; 363, 364) constructed by 20  
complementary coupling structures of the toner containers and the toner hoppers so that a toner container containing a toner having a specific colour is exclusively coupled to a specific toner hopper. 25

2. The toner supplying device according to claim 1, wherein the toner container identifying means includes ribs (263) protruding on one side of each toner container (261) at different locations depending on the colour of the toner contained in the toner container, and grooves (264) into which the ribs are inserted, and formed on the toner hoppers (262) at the locations corresponding to the ribs. 30

3. The toner supplying device according to claim 1, wherein the toner container identifying means includes grooves (364) on one side of each toner container (361) at different locations depending on the colour of the toner contained in the toner container (361), and ribs (363) into which the grooves (364) are inserted, and protruding on the toner hoppers (362) on which the toner containers (361) are mounted, at the locations corresponding to the grooves (364). 40  
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FIG. 1

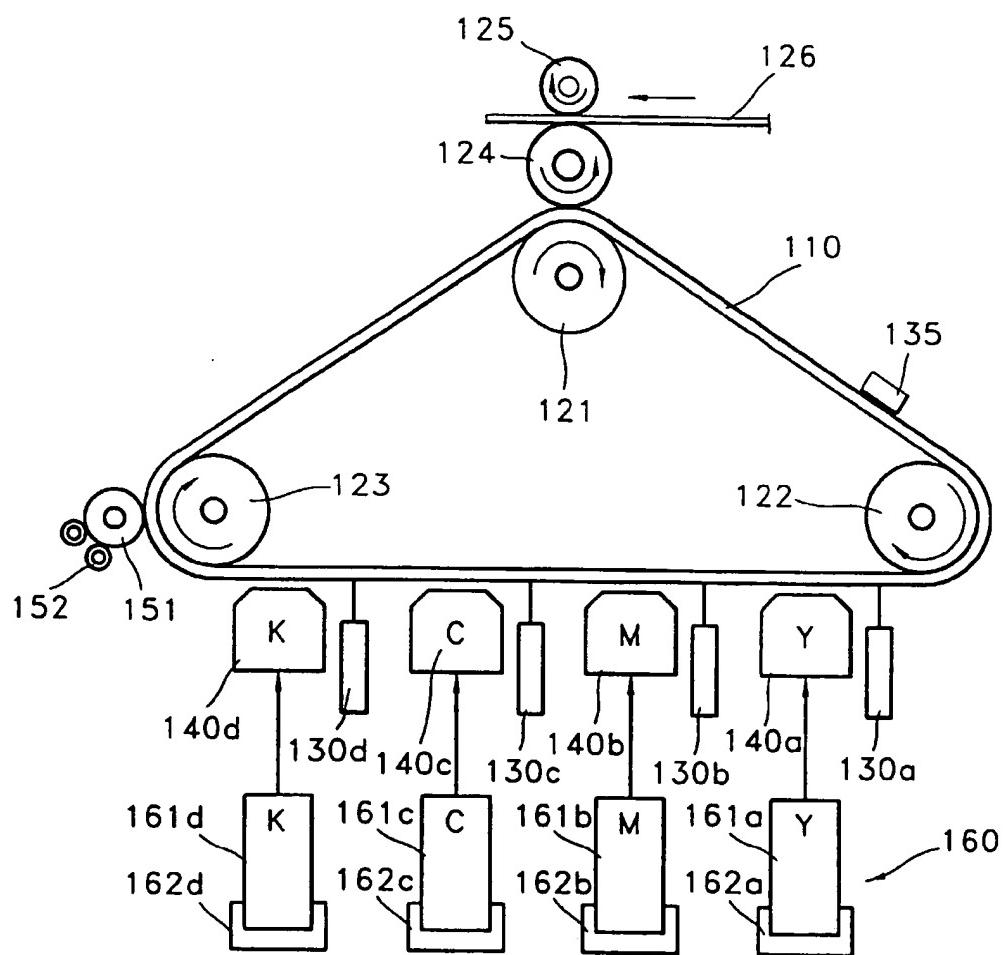


FIG.2

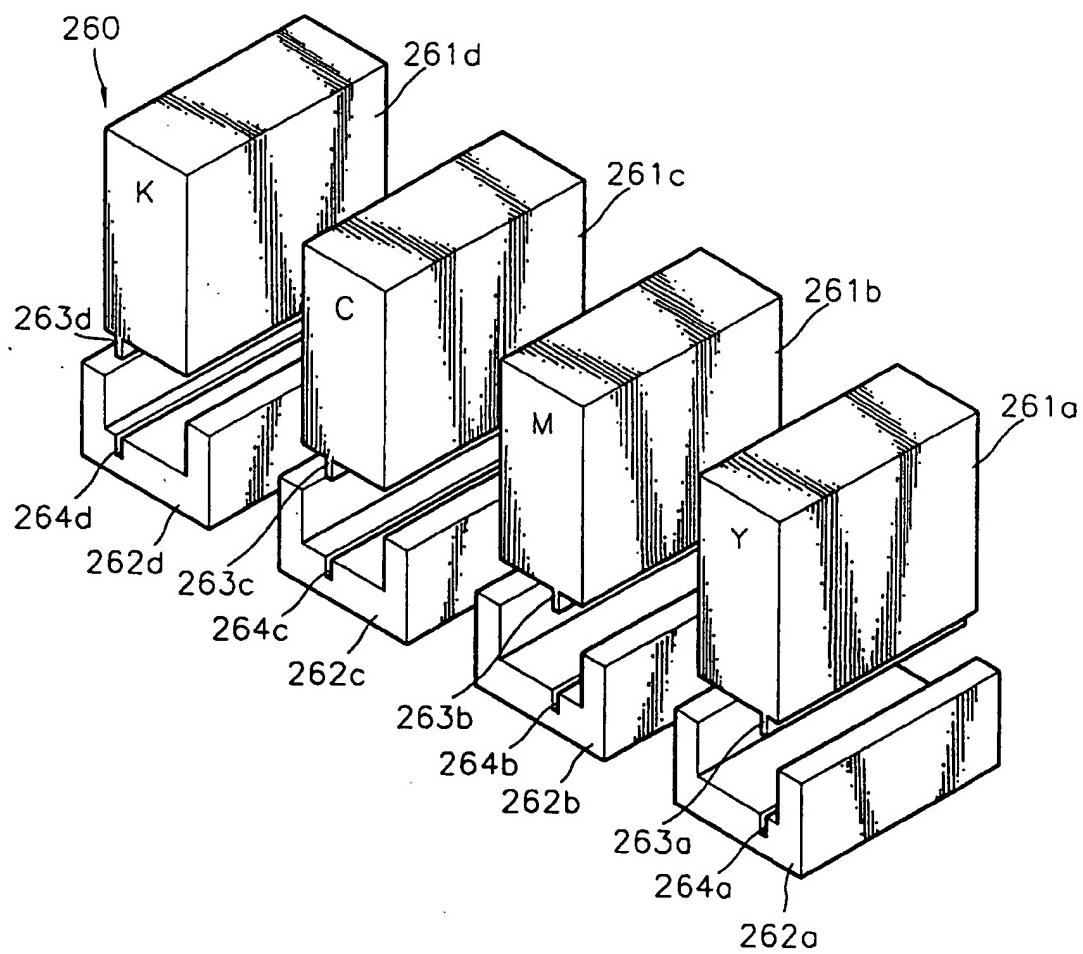
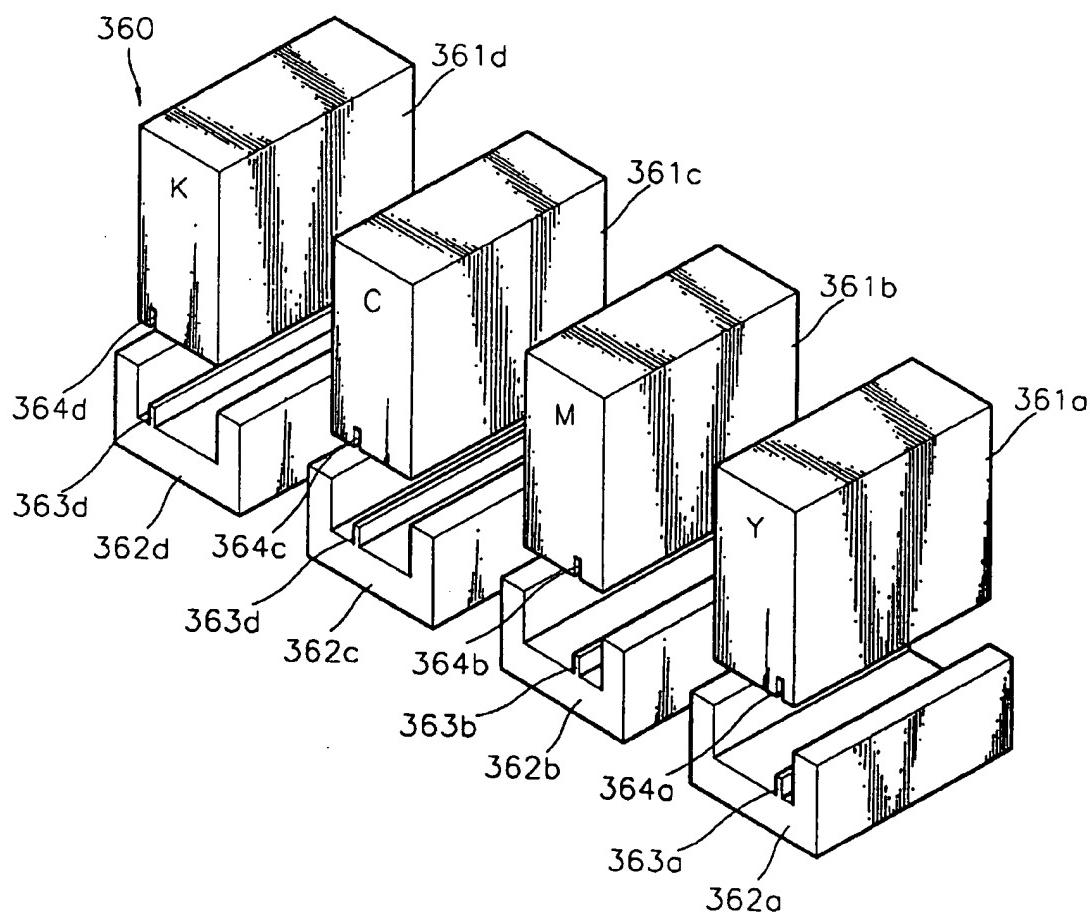


FIG.3





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## EUROPEAN SEARCH REPORT

Application Number  
EP 98 30 5473

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 5 530 531 A (GIRARD JAMES J) 25 June 1996 * the whole document * ---	1	G03G15/08 G03G15/01
X	EP 0 571 767 A (KONISHIROKU PHOTO IND) 1 December 1993 * claim 3; figures * ---	1	
X	PATENT ABSTRACTS OF JAPAN vol. 010, no. 190 (P-474), 4 July 1986 & JP 61 035468 A (HITACHI METALS LTD), 19 February 1986 * abstract * ---	1	
X	PATENT ABSTRACTS OF JAPAN vol. 008, no. 257 (P-316), 24 November 1984 & JP 59 126565 A (CANON KK), 21 July 1984 * abstract * ---	1	
X	PATENT ABSTRACTS OF JAPAN vol. 010, no. 369 (P-525), 10 December 1986 & JP 61 162071 A (KONISHIROKU PHOTO IND CO LTD), 22 July 1986 * abstract * ---	1	TECHNICAL FIELDS SEARCHED (Int.Cl.6) G03G
X	PATENT ABSTRACTS OF JAPAN vol. 016, no. 085 (P-1319), 28 February 1992 & JP 03 269461 A (KONICA CORP), 2 December 1991 * abstract * ---	1	
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The present search report has been drawn up for all claims			
Place of search <b>BERLIN</b>		Date of completion of the search <b>30 October 1998</b>	Examiner <b>Hoppe, H</b>
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



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## EUROPEAN SEARCH REPORT

Application Number  
EP 98 30 5473

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.6)												
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim													
X	PATENT ABSTRACTS OF JAPAN vol. 016, no. 080 (P-1318), 26 February 1992 & JP 03 267965 A (KONICA CORP), 28 November 1991 * abstract * -----	1													
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)												
<p>The present search report has been drawn up for all claims</p> <table border="1"> <tr> <td>Place of search <b>BERLIN</b></td> <td>Date of completion of the search <b>30 October 1998</b></td> <td>Examiner <b>Hoppe, H</b></td> </tr> <tr> <td colspan="3">CATEGORY OF CITED DOCUMENTS</td> </tr> <tr> <td colspan="3">           X : particularly relevant if taken alone            Y : particularly relevant if combined with another document of the same category            A : technological background            O : non-written disclosure            P : Intermediate document         </td> </tr> <tr> <td colspan="3">           T : theory or principle underlying the invention            E : earlier patent document, but published on, or after the filing date            D : document cited in the application            L : document cited for other reasons            &amp; : member of the same patent family, corresponding document         </td> </tr> </table>				Place of search <b>BERLIN</b>	Date of completion of the search <b>30 October 1998</b>	Examiner <b>Hoppe, H</b>	CATEGORY OF CITED DOCUMENTS			X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : Intermediate document			T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		
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